

Status Update of Continuous Wave and Long Pulse tests on XM46.1 and X3M2

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The foreseen European XFEL High Duty Cycle upgrade requires driving the accelerator either in Continuous Wave or in Long Pulse mode of operation. In the Long Pulse mode of operation, the duty factor of the RF pulses is higher than 5% as opposed to the actual value of 1.4%. Therefore it is required to adapt the control system to operate with the new pulse parameters and, at the same time, preserve an RMS stability of the accelerating field of 0.01% in amplitude and 0.01° in phase. In the injector, where the maximum accelerating gradients will be realized, the accelerating cavities will operate at 20 MV/m with a loaded quality factor in the order of $6e7$. Therefore tests with similar gradients, conducted at the CryoModule Test Bench on XM46.1 are presented along with RF stability measurements. Additional tests on the 3.9 GHz third harmonic module X3M2 are presented as well. The current third harmonic module used at European XFEL lacks piezoelectric tuners. Therefore the tests are crucial to determine whether a modification of the cryomodule is required.

Keyword

Stability measurements, FEL, SRF, Cryomodule

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